

Final Exam

Name: _____

Student ID: _____

Instructions: You are free to use 1 page of notes on this exam. You may not access the internet for any reason during the exam. You must show your work for each problem. NO CREDIT will be given for solutions which do not show work.

Problem 1. Compute the following indefinite integrals:

a) (4 points)

$$\int \frac{\ln(x)}{\sqrt{x}} dx$$

b) (4 points)

$$\int \frac{dx}{x \sqrt{\ln(x)}}$$

c) (4 points)

$$\int \sec^6(x) \tan^4(x) dx$$

d) (4 points)

$$\int x^2 \sqrt{x-1} dx$$

e) (6 points)

$$\int \frac{2}{x^3 \sqrt{x^2 - 1}} dx$$

f) (6 points)

$$\int \frac{x^5 + x^3 + 3x^2 - x + 3}{x^3 + x} dx$$

Problem 2. Decide whether the following improper integrals converge or diverge. You must show your work and state your reasoning for credit.

a) (4 points)

$$\int_1^{\infty} x^2 e^{-x} dx$$

b) (4 points)

$$\int_2^4 \frac{dx}{(x-3)^{2/3}}$$

c) (4 points)

$$\int_1^{\infty} \frac{2 - \sin(x)}{\sqrt{x}} dx$$

d) (4 points)

$$\int_1^{\infty} \frac{x^2 + x + 1}{2x^4 + 2x^3 + x - 1} dx$$

Problem 3. (6 points) Compute the **mean** and **median** for the random variable with probability density function

$$f(x) = \frac{1}{9}x^2 \quad \text{over } [0, 3].$$